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The Lubrication of Rubber*

A RAY OF LIGHT ON A DARK SUBJECT

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For unexplained reasons, standards, design theories and correlated practical experience on the use of rubber parts are less known, to the industries largely involved, than on any other product employed in the production of an automobile. As with all other arts concerned in the fabrication and maintenance of a car — there are, however, no secrets. This article, therefore, offers nothing new to the comparatively few to whom the application of rubber in the automotive field is no mystery. It is offered in the hope that it will shed a little light to assist those who desire a better understanding of this subject and a method of its treatment.

For the purpose of making the automobile lighter and quieter, as well as more flexible and comfortable, rubber has long been used. This use of rubber has played a tremendous part in the advancement of the automobile to its present state of development and, in the construction of the present-day car, as many of 275 rubber parts and fittings are used.

This article is largely concerned with the problems of lubricating, if and when necessary, such rubber parts as are designed to withstand a certain strain or carry a definte load, including the harmful or disintegrating effects on such parts of the application of petroleum oils, greases, and other mixtures of lubricants and solvents. No attempt is being made to expound the theory of flexing on the fatigue life of rubber under loads, both proper and excessive, except where a lubricant is required and applied.

The majority of these rubber parts do not present any problem pertaining to squeaks or lubrication. In theory none of them should squeak, as rubber is supposed to flex within itself—that is to say, the latitude of motion furnished by the flexing of the rubber should not produce squeaks. Squeaks do, however, occur from a limited number of rubber parts, due to friction developed between a rubber part and the adjacent metal. When such squeaks are present in a car to be lubricated, it is absolutely necessary that they be properly removed, as they are apt to cause a customer to be dissatisfied with and condemn an otherwise good lubrication job. This requires a careful investigation to determine just which parts, if any, are causing squeaks. Such squeaks on two cars of identical model might conceivably come from entirely different parts. In some cases, a rubber squeak can be corrected by a mechanical adjustment. Such an adjustment must, however, be made with knowledge and precision, as a rubber fitting which is tightened too much might increase the squeak through improper displacement of the rubber, or might even cause rapid destruction of the rubber part due to excess pressure. In other cases it may be necessary to replace a rubber part which has become enlarged, devitalized or rotted due to the careless or improper use thereon of petroleum products or other injurious materials, with the result that the part can no longer function in the manner for which it was designed.

On some cars, a few parts are manufactured from synthetitc rubber and could be lubricated safely with materials which would harm natural rubber. Since they constitute a very small percentage of the total of "rubber" parts used and, further, since it is impossible for the service attendant to distinguish between a part made of natural rubber and one of synthetic rubber, the practice recommended is the applying on the synthetic rubber parts of the same rubber lubricant which is used on those parts made of natural rubber.

Many rubber parts are carefully engineered to carry and withstand a predetermined strain or load. These are built to known specifications and are rechecked for accuracy with an instrument known as a durometer. By this durometer it is possible to measure the degrees of hardness of moulded rubber. Any treatment which tends to devitalize or soften rubber below its safety factor, as indicated by a decrease in the durometer reading, naturally causes the rubber to be no longer suited to carry the load for which it was designed. For this reason the automotive engineer has been eluctant to endorse the use of any type of lubricant on rubber parts.

The sensitive characteristic of rubber to react unfavorably to practically any material used for the purpose of lubrication has long presented a difficult problem. Chemical research has established the facts that of all materials applied to rubber parts, petroleum products cause the most accelerated and unfavorable reaction, while water is least harmful. One of these unfavorable reactions is swelling or distortion which is easily visible. Another is devitalization or

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softening, the degree of which can be determined by durometer measurement.

Generally speaking, from the standpoint of lubrication, there are two kinds of rubber parts:

A. Rubber Parts Requiring a Penetrating Lubricant.

B. Rubber Parts on Which It is Preferable to Use a Clean Surface Lubricant.

These are more fully described as follows:

A. Rubber Parts Requiring a Penetrating Lubricant. Rubber bushings, shock absorber and stabilizer linkage, mountings, strippings, shackles, bearings, certain grommets, rubber spring inserts, etc., from which squeaks *sometimes* occur, often require lubrication. Such points can be properly lubricated only with a very penetrating *rubber* lubricant. This is explained by the fact that these parts are not equipped with any lubrication fittings, channels, or holes through which a lubricant can be applied.

The lubricant used must be capable of extreme penetration in order to get between the rubber and the adjacent surface. Such rubber parts, when assembled, are usually under compression which results in the forming of a perfect seal. This seal is comparable to that formed by a rubber cork which fits tightly into the neck of a bottle. It will restrict the passage of any material, regardless of its penetrating properties. In order to permit penetration of an applied lubricant, it is, therefore, necessary that this seal be relaxed by oscillation of the part. This sometimes requires vigorous action which can be accomplished by rocking the car or driving it a short distance. Thus, it is obvious and preferable that the lubricant used should not contain a highly volatile vehicle which would be dissipated before the car could be used, thereby defeating the possibility of penetrating the seal and reaching the point of friction.

In attempting to remove a stubborn rubber squeak, it is well to remember this point, for if a fast-congealing rubber lubricant containing a highly volatile solvent is being used, it will be necessary to induce extreme oscillation of the part by rocking the car while the lubricant is being applied. If a slow-congealing, water soluble lubricant is used, all necessary rubber parts can be treated, and then the car rocked or driven in order to produce the required results. Only a fraction of a drop may be required to remove a squeak, but this small portion must actually creep or be worked into the place where the squeak occurs.

Due to the porosity of moulded rubber, an ideal condition is offered for the effective use of colloidal graphite. In addition to the increased film life that it produces, it is also a positive static eliminator. This feature of a graphited rubber lubricant is effective in quieting squeaking or static producing fan belts.

In applying a rubber lubricant of the penetrating type on rubber parts which are either on the chassis or body of the car, extreme care should be exercised in the use of rubber lubricants which contain ingredients destructive to the car finish or poisonous to the lubricating attendant. This type of rubber lubricant must never be used on car door, trunk or deck seals or any other part where it can come in contact with the body lacquer or finish.

Among the types of rubber parts in the modern car which require a penetrating type of lubricant, there are certain parts commonly listed as bushings, which as a matter of fact, should be listed as rubber bearings, due to the reciprocating action of the assembly within them. The use of these bushing type bearings is showing a rapid increase in current models. In addition to their original use where they were present in most cars in the steering column assembly, they are now in general use in the new steering column gear shift linkage and in shock absorber and stabilizer connections.

These rubber bearings are of two types—regular plain moulded rubber, and the inner-liner type. These inner-liners consist of either a lubricant impregnated webbing moulded into the inner face of the bearing, or are made up of moulded rubber firmly vulcanized on a metal sleeve. Theoretically these bearings will function without service lubrication. Field experience has, however, proven this to be a fallacy, as lack of lubrication has resulted in squeaks and binding.

The application of a lubricant to these parts is a simple procedure. Inasmuch as most of these bearings were manufactured with an impregnated graphite, it is obvious that relubrication with a harmless graphited rubber lubricant will restore their original free action. With this type of rubber lubricant now in general use, and having wide distribution, it is only reasonable to predict that the car of tomorrow will have the proper openings for the relubrication of this type of rubber bearing.

B. Rubber Parts on Which It Is Preferable to Use a Clean Surface Lubricant. In this classification of rubber parts where squeaks occasionally occur, a surface lubricant is required in contrast to a penetrating type as explained above. These parts include rubber seals, strippings, mouldings (such as seals around the car doors, trunk and deck compartments), window channels, rubber hood lacings and bumpers. These parts contact the metal—as when the hood is locked in place, or when the door or the trunk compartment is closed.

Inasmuch as cleanliness and lubrication are of equal importance in the servicing of these parts, the use of any type of liquid lubricant would be objectionable. It is advisable to use a light application of a Stainless Stick Lubricant on the surface of these rubber parts or directly to the point of friction on the body, as a thin film of this would provide a satisfactory lubricant without the hazard of injuring the body finish or collecting excessive dirt where it is apt to be contacted by passengers' clothing.

Early Spring Weather Precautions

There is a period of weather between winter and summer which cannot be classed as either cold or hot. At that time of year when winter's icy blasts are beginning to give in, somewhat reluctantly, to the balmy breezes of early spring, one can never be sure as to whether there may be more "freezing weather" ahead or not. During this period there is a hesitancy on the part of the owner to go to a heavier grade of motor oil and to delay the draining of the cooling system anti-freeze solution.

While it is advisable that these change-overs be delayed until there is no possible likelihood of more freezing weather, there are certain precautions that should be taken into consideration.

Please Mail The Reply Card

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The Cooling System

If an alcohol solution is being used in the cooling system, the warmer weather will cause more rapid evaporation. This means the solution level should be checked more frequently. Also, if and when another cold snap should occur, the strength of the anti-freeze mixture should be tested for protection against a possible "freeze-up," and enough alcohol added to protect the system at the prevailing atmospheric temperature. (This does not apply to permanent types of anti-freeze solutions).

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*Car Manufacturers' Latest Recommendations**

1940 LINCOLN ZEPHYR

The manufacturer no longer recommends the optional use of Mild Extreme Pressure Gear Lubricant in the transmission on 1940 Lincoln Zephyr models. A straight Fluid Gear Lubricant only is recommended. This change in recommendation is due to the fact that in some cases, where stations do not have a mild EP Lubricant, a powerful type EP Lubricant might be used, resulting in damage to some of the bronze bushings within the transmission case.

On 1940 Lincoln Zephyr models there is an oil hole with a flip-top cover, located at the upper end of the steering column just under the steering wheel, on the front side. This is for lubrication of the gear shift shaft with a few drops of motor oil, in case hard shifting is experienced. The shaft is mounted in an oil impregnated felt bushing at this point.

Fluid For Oldsmobile Hydramatic Transmission

This fluid is stocked by Oldsmobile dealers in one quart cans without labels and without identification of any kind other than a rubber stamp on top of the can giving the name "Oldsmobile Hydra-Matic Fluid" and the Oldsmobile part number. Oldsmobile recommends that this fluid *only* be used in the Hydra-Matic transmission and that service be performed by an authorized Oldsmobile dealer.

Welcome W. C. Hardesty & Co., Inc.

We are pleased to announce that W. C. Hardesty & Co., Inc., has become an Associate Member of the Institute. Mr. Hardesty, President, located in New York City, will represent the company.

Crankcase Ventilation

Crankcase Ventilation

During the annual meeting of the Society of Automotive Engineers held in Detroit the week of January 15, 1940, a paper on the formation of varnish and sludge in engine crankcases was presented. This paper stressed the importance of adequate crankcase ventilation as a major factor in eliminating these formations, and brought out the fact that car manufacturers are giving the subject serious attention and consideration.

Engine ventilating systems, used to prevent harmful dilution of motor oil, utilize the crankshaft as a blower to force fuel vapor and water vapor (a product of combustion) from the crankcase through a ventilating outlet. The ventilating system removes a large portion of all fuel dilution and, under average driving conditions, removes all water vapor.

When engines are new, the crankcase ventilating system operates at full efficiency, but since the air inlets, and sometimes the outlets, are provided with a filtering element to prevent any foreign matter from entering with the air, the amount of air gradually becomes reduced as the filter becomes clogged. Therefore, these air filters should be cleaned periodically if adequate ventilation is to be a factor in helping to eliminate the formation of varnish and sludge.

The average car owner does not realize that units of this nature are used. He, therefore, never asks that the filters be cleaned. Moreover, a survey at thirteen neighborhood stations of various oil companies, revealed not only the fact that car owners never ask for this service, but that only three out of the thirteen stations habitually cleaned even the oil filter tube cap in which the crankcase ventilator inlet filter is located on the majority of cars. None of the stations had ever serviced any crankcase ventilator outlet filters. It was found during this survey, however, that all stations were soliciting carburetor air cleaner service. This was undoubtedly due to the fact that an extra 25 or 50 cent charge is made for this service.

It appears from the above that, while car manufacturers are doing their utmost to provide adequate crankcase ventilation, petroleum service stations must make the servicing of these air filter units a regular part of lubrication procedure if the desired results are to be obtained.

The ventilator inlet used on the majority of engines is in a unit with the crankcase oil filler cap. The cap is designed with a perforated inverted cup that surrounds the filler cap proper, the space between the inside band and the inverted cup being packed with oiled copper gauze through which the incoming air passes. This unit (the oil filler cap with its oiled copper gauze packing) is easily removed for filling the crankcase, but in many cases, proper cleaning of the unit before replacing, is neglected.

This cap should be thoroughly cleaned in kerosene or solvent and reoiled with motor oil every time a car comes in for a lubrication job, or every 1,000 miles, if a free flow of fresh air into the crankcase is to be maintained.

All crankcase ventilator inlets are not of the same construction, nor are they in the same location on the crankcase. On Pontiac cars the copper gauze element is not removable, except by removing the crankcase oil filler tube assembly as a unit. The removal of this is accomplished by loosening the cap screw at the base of the filler tube where it meets the crankcase. After removal, the top end of the tube containing the copper gauze can be cleaned by washing in kerosene or solvent, after which it should be reoiled with motor oil. The Pontiac outlet tube, which also contains a filter, can also be removed from the engine and the filter cleaned in a similar manner.

On Buick cars, in addition to the filter in the crankcase oil filler cap, there is another crankcase ventilator inlet located on either the right or left side of the upper crankcase (depending on the model), that is also packed with copper gauze. Both of these filters should, of course, be cleaned every lubrication period. Also, Buick cars (as well as several other makes), when equipped with oil bath type carburetor air cleaners, have an outlet filter fitted with copper gauze which should likewise be cleaned. The crankcase ventilator inlet and outlet located on the side of the Buick crankcase are removed by loosening the cap bolt that holds them to the side of the case.

Usually crankcase ventilator outlet tubes are extended below the engine pan and are trimmed off at the lower end on an angle so that the motion of the traveling car creates a suction which accelerates the outlet air flow. Where copper gauze or other air filtering mediums are used in air outlet tubes, they are there to catch any dirt or dust that might be sucked into (not expelled from) the crankcase, when the car is parked over a dusty surface, due to the hot engine creating a vacuum as it cools.

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It requires only one minute to service a crankcase ventilator inlet filter of the oil filler tube design, which is more universally used than other types. The time required to service other air inlet filters is not more than three or four minutes. Even servicing air outlet filters requires no more time than inflating all tires to their proper pressures. In other words, it is, or should be, a free service. So provide this service—and tell the car owner what has been done and why. He will appreciate it and will tell others about it. You'll find that the customer confidence gained by this small but important service will pay big dividends in increased business and resultant profits.

Crankcase Oil

During this early spring weather, the car owner, as a rule, continues the use of the winter grade of motor oil (usually No. 10W). This is a perfectly sound practice, but it must be remembered that due to the urge of spring being in the air, good roads, etc., higher speeds take place, resulting in some cases in more rapid oil consumption. The oil level should, therefore, be checked at more frequent intervals.

Batteries should also be checked more often and the solution kept at 3/8" above the top of the plates. Do not overfill.